KEYBOARDING—THE KEYSTONE OF COMPUTER LITERACY

The author—using the above title—in 1985 published an article in the March/April issue of the BALANCE SHEET, a national business education periodical. During the intervening 20+ years, nothing has occurred to alter this writer's position regarding the value of a keyboarding skill. As is obvious to all, the keyboard continues to overwhelmingly dominate computer data entry.

Admittedly, in 1985 the author expected voice recognition technology to soon become a major player in computer data entry. Following the widespread use of personal computers, numerous computer magazines emerged to serve the new "PC" market. A view supported by many of these publications was that with sufficient increases in the personal computer's processing and memory capability, voice recognition would replace the "typewriter keyboard." On a humorous note, few of the computer publications exist today that so confidently predicted the demise of the mechanical keyboard. Through the years, a great rarity in computer publications were articles that spoke positively of the Universal or QWERTY keyboard. Aware that few of its readers possessed an efficient keyboarding skill, computer publications attempted to alleviate, or pamper, this problem by promoting voice recognition and alternative keyboards. Indeed, the Universal Keyboard that today connects to every computer processor has been viewed more as an operational obstacle than the essential data entry service it provides.

Recognizing its failed promise to become a "killer application," what is the future of voice recognition technology? Compared to the 1980's, today there is minimal interest displayed in voice recognition. While viewed as a "novelty" by teachers attending business education conferences in the first days of computer usage, today's exhibitors of voice recognition software must work to attract teachers to their exhibit. Dr. Ivan Wallace of East Carolina University, a knowledgeable proponent of voice recognition, states that present voice recognition software is far superior to that of previous developmental stages and it awaits an awareness of this increased capability by keyboarding instructors. An encouragement for voice recognition enthusiasts is that several states now offer voice recognition instruction as well as keyboarding instruction in its public schools.

In 1985 the writer anticipated that voice recognition would eventually replace the computer keyboard in the mode that the automobile replaced the train for personal travel—almost totally. Today, these thoughts have been modified to conclude that voice recognition's replacement of the keyboard will more likely parallel the replacement of automotive travel by airplane travel—very little. But, surely we can expect a far greater acceptance of voice recognition in the next 20 years than we have observed over the past 20 years. However, there appears little reason to think that during this 20 year period the keyboarding skill will cease to play a major role in efficient computer usage. Keyboarding instruction remains a highly important element of future computer literacy/technology instruction.

KEYBOARDING IS NOT TYPEWRITING

In terms of their user impact keyboarding and typewriting are quite different. Typewriting was, in essence, a highly legible substitute for handwriting, dealing solely with the creation and formatting of text materials—letters, reports, etc.— today known as word processing. In contrast, keyboarding is supportive of any subject that can be digitally "keyed" into a computer—a near endless number of potential applications. The physical keying skills of keyboarding and typewriting are closely identical, their differences being in the applications they support. As typewriting supported only word processing the two were logically taught as a single course. In contrast, as keyboarding supports word processing—plus thousands of other computer applications—it does not identify with any application, but is taught by itself. Thus, keyboarding instruction is simply that—teaching a keyboarding skill. Although it is necessary that keyboarding instruction impart some basic formatting procedures that identify with word processing, should a student wish to become a proficient word processor, he enrolls in a word processing course after attaining a touch keyboarding skill.

Typewriting's single application, word processing, generally limited the use of a typing skill to career oriented office occupations, a small segment of the total population. Although typewriters were available in many homes for personal use, the difficulty in applying "hunt & peck" skills to create the simplest of documents was formidable, drastically limiting the typewriter's in-home use. For example, the writer's interaction with the "family" typewriter was near zero until he completed a high school typewriting course. Why? Unlike today's computer with its many intriguing applications, "fun" even for "hunt & peck" users, the typewriter's ability to only place inked characters on a sheet of paper removed it from the list of "fun" things to do. This "nonfun" status, in combination with a restrictive "nontouch" skill, prevented most home typewriter users from even progressing to a "hunt & peck" level that later required remediation by a typewriting teacher.

Today, in marked contrast to the typewriter era, practically everyone needs, or wishes, to keyboard at a computer. In summary, occupationally based typewriting was for a select few, while today's keyboarding serves all areas of society. Indeed, keyboarding is for everyone..

What are the principal differences between traditional typewriting instruction and computer based keyboarding instruction? Four things: 1) Traditional typewriting enrolled mature, career oriented high school students while keyboarding enrolls far less mature, and less directed, prehigh school students. 2) Typewriting largely enrolled novice, beginning students while keyboarding largely enrolls self taught "hunt & peck" performers, schooled on home computers. A beginning student requires only to be "taught," while the "hunt & peck" student must first be "untaught," then "taught." 3) Typewriting enjoyed the luxury of excess time. The 12 week quarter and 18 week semester in fact required repetitious activities, attested to by a review of traditional typing textbooks. In contrast, keyboarding, a late comer, and one of some dozen elements that now crowd the computer literacy/technology course, has yet to attain a specific role, or niche, relative to other course components. 4) Typewriting was overwhelmingly instructed by dedicated, professional typewriting instructors. Keyboarding is now often taught by knowledgeable computer literacy instructors whose employment was gained by factors other than a typing skill, or an ability to instruct keyboarding. To address this problem, inservice

programs have been established in some states to ensure that middle school computer literacy instructors are provided a minimal understanding of keyboarding instruction procedures.

COMPONENTS OF KEYBOARDING INSTRUCTION

Early in the 20th Century, Dr. William Book, who later gained recognition as the "father" of formal typewriting instruction, famously stated that the student should type as rapidly as he can type accurately. This contradictory directive resulted in keying accuracy being viewed as more important than keying speed in the development of a typewriting skill. To the initial instruction elements of speed and accuracy, some years later keying technique was added. The following analysis of the three instruction components proposes to show that only one of the three possesses any instruction merit.

KEYING SPEED. Speed of keying remains the basic goal of keyboarding instruction. This involves the quickness with which a specific key is associated with a specific finger—far more a mental activity than a physical process.

KEYING ACCURACY. Accuracy instruction is not today, nor has ever been, a positive contributor to keyboard productivity. Teachers, including this writer, who have maintained and analyzed student error records are aware that errors per minute rates remain constant regardless of the length of instruction time. This figure is two errors per minute for the average keyboarder who completes a single trial on copy of average difficulty. Keying errors are the result of imperfections in the human nervous system, a breakdown that occurs twice each minute for an individual who possesses a normal or average nervous system. Students with stronger than normal nervous systems, sometimes described as having "iron nerves," will average less than two errors per minute, those with weaker than normal nervous systems will average more than two errors per minute. Again, for a student with a typical nervous system, the two errors per minute figure is as applicable at the end of one instruction week as it is at the end of a completed year of instruction. In maintaining error records for his own keyboarding classes, the writer observed a single exception to this rule. During the first week or two of scored timings, classes would occasionally average slightly less than 2 errors per minute, but soon reverted to the full 2 errors per minute. Thus, in terms of errors per minute, my most accurate typing classes were those with the least keyboarding practice.

Students, or keyboarders, do become more accurate in their output, but only by increasing their keying speed. As accuracy remains constant, increased keying speed spreads the constant number of errors among an increased number of words. A student who keys 10 words per minute makes one error per five words; yet, a student who keys 50 words per minute makes one error per 25 words. Thus, the 50 words per minute student is five times as accurate as the 10 words per minute student. Assuming the keying of a 100 word letter, the 10 words per minute typist requires 10 minutes to key the text while making and correcting 20 errors; in contrast, the 50 words per minute typist requires only 2 minutes to key the text while making and correcting only 4 errors.

In the scoring of keyboarding timings, keying errors must be accounted for despite their resistance to all instruction efforts to bring about their reduction. Obviously, a failure to do so allows a student to merely depress a repeating keyboard key, totally masking his true keying skill. However, the weight given keying errors relative to keying speed should be quite modest. As the statistical reliability of error rates for three and five minute timing intervals has approximately one fifth the reliability of related keying rates, logically, errors should account for no more than 20% of any combined speed-error score.

Now to review the principal educational research that relates to typewriting accuracy. In 1967, Dr. Jerry Robinson conducted an investigation of typewriting performance that included all Indianapolis public high school students (Robinson, J. W. The relation of copy difficulty to typewriting performance, DELTA PI EPSILON J., 1967). To analyze keystroke accuracy, Robinson measured keying errors at the end of 12 instruction weeks and repeated this measurement at the conclusion of each subsequent six week period. Students were given a single 5 minute timing, typing from copy of average difficulty. Robinson determined that for weeks 12, 18, 24, 30, and 36, student error rates remained constant—2.0 errors per minute. These figures provide no support for the employment of classroom drills that purport to increase the accuracy of keyboarding students, i.e., decrease keying errors. In addition to Robinson's massive study, De Hamer in 1956 conducted an investigation of typewriting skills that involved 30 Iowa high schools (De Hamer, D. J. A study of the performances of first-year typing students on straight-copy writings. Master's thesis, State U. Iowa, 1956). Rather than limiting students to a single timing trial, De Hamer scored the better of two student timings, all typed from easier than average copy and scored for net—not gross—words per minute. Under conditions less difficult than those imposed in the Robinson study, De Hamer determined that after 18 weeks students averaged 1.1 errors per minute and at the end of 36 weeks they averaged 1.0 errors per minute. Both studies emphasize the futility of attempting to reduce student error rates. With minimal classroom time available for today's keyboarding instruction, surely the time long expended on accuracy drills will be applied to the productive development of keyboarding speed.

Prior to the personal computer's classroom arrival, the author published a related article that analyzed student typewriting errors. Titled "Typing Accuracy," the writing appeared in the February 1978 issue of THE JOURNAL OF BUSINESS EDUCATION.

KEYING TECHNIQUE. Following the early years of typewriting instruction during which its content was based upon keystroke speed and keystroke accuracy, a third instruction element was added—keystroke technique. Keyboarding technique deals with the ideal execution of physical actions that affect keystroke productivity. These actions are based on a lengthy list of techniques, including the placement and movement of hands, feet, fingers, back, elbows, wrists, etc. Dedicated proponents of technique instruction propose that only following a student's mastery of "perfect" techniques should the instructor begin to emphasize basic keystroke speed and keystroke accuracy.

The theory of technique instruction is that "perfect" techniques bring forth maximum keyboarding speeds and minimal error rates. Unfortunately, the association of physical techniques with keyboarding output is correct—but backwards. High keystroke speeds spawn supporting physical techniques, not the reverse. For example, having a beginning student to

"curve" his fingers in the manner of a 60 words per minute keyboarder does nothing to increase his speed, but in fact hinders his natural development as noncurved fingers support keying rates up to 15 words per minute. In contrast, to maintain physical pace at 60 words per minute—five strokes per second—requires the keyboarder to coil his fingers in the mode of a fast striking rattlesnake. Conclusion: mental finger-key associations automatically elicit the needed level of supporting physical techniques, while instruction efforts to unnaturally "hurry along" physical techniques is without merit, but markedly wasteful of classroom time.

Having proposed that the lengthy list of currently taught keyboarding techniques occur in "nature," the writer would point out that a far more important instructor role is to maintain student enthusiasm and alertness. The student who operates the keyboard with enthusiasm automatically exhibits an alert performance posture. For the less enthused student, it should be noted that proper posture is heavily dependent upon body balance. With nearly all students experienced bicycle riders, an activity dependent on constant balance and alertness, "sloppy" students benefit from being reminded to "get on their bike." The physical structure of individuals varies greatly and to suggest that all students must exhibit the same technique mode is baseless. Marked variation in physical stance, movement, etc. exists among professional athletes in the performance of their sport. Why should such physical variation not be expected among developing keyboarding students? Not only do physical techniques differ among individual performers, but each performer alters his techniques at various levels in his skill progression. The proper objective of keyboarding instruction is the development of an enthused, alert student, this in turn enabling the student to determine his own "perfect techniques."

Although not classified as a true keyboarding technique, the student's striking of each keyboard key with the correct finger is the basis of a productive touch keying skill—and thus the most important objective of keyboarding instruction. Keying speed, the essence of keyboarding skill, is based upon student classroom enthusiasm and the efficient application of all fingers in operating the keyboard.

The writer has been unable to locate even one published research study that relates to the value of teaching specific physical techniques in keyboarding classes. Despite this lack of research regarding the value of keyboarding technique instruction, textbook and software publishers are increasingly presenting keying techniques as the principal component of their instruction program. To date, much like motherhood and apple pie, the heavy emphasis on technique instruction has encountered little resistance from keyboarding instructors. But, who could oppose the development of "ideal" keying techniques? The question is, do the techniques emulate those of a 100 words per minute professional performer, or are they based on the specific needs of a novice keyboarding student? The writer during his early years of typewriting instruction admits to frequently instructing students in the positioning of their feet (both on the floor, spread slightly, one foot in front of the other!), arms, legs, hands, etc., etc. Would it be possible that today—somewhere--a first day keyboarding class is being instructed to key without errors, with their fingers tightly curled? Hopefully, such negative instruction has gone the way of the once popular and questionable practice of engaging students in finger gymnastics. Surely, along with accuracy drills, the wasted energy and time long expended on technique instruction will be transferred to developing keyboarding speed.

CONVERTING "HUNT & PECK" KEYBOARDERS

The remediation of sighted "hunt & peck" typists demands that these students be prevented from visually guiding their fingers about the keyboard. However, this process conflicts with typewriting instruction's long practice of permitting students to visually observe their fingers and the keyboard. Many teachers of the typewriter era are critical of keyboarding instruction's current restriction on the use of vision. However, there is a fundamental difference between the students who enrolled in typewriting and those who presently enroll in keyboarding. Typewriting students were true beginners who from their first typewriter experience learned to apply correct fingering patterns. In contrast, today's keyboarding students, of necessity, have previously engaged in self-instruction that overwhelmingly resulted in the use of only their stronger fingers. Thus, to prevent "hunt & peck" students from continuing to practice inefficient finger usage requires that they not be allowed to visually guide their fingers. In summary, typewriting teachers only had to prevent "hunt & peck" habits, while current keyboarding teachers are required to eradicate ingrained student "hunt & peck" habits, a truly difficult and time consuming process.

Typewriting instruction purist argue that if a student chooses to visually observe the keyboard it is for the necessary purpose of determining the location of a key. However, every "hunt & peck" activist has engaged in numerous strikes at each key—an ample number to memorize each key's location. Little understanding exists that the "hunt & peck" keyboarder does not visually search the keyboard to LOCATE a key, but rather to GUIDE an activating finger to that key. Indeed, a true "hunt & peck" performer, one involved in his first keyboarding experience who must search out every key, cannot keyboard above a one to two words per minute rate. Obviously, a sighted "hunt & peck" keyboarder who keys at a rate above ten words per minute is quite aware of each key location, the problem being how to "get" the selected finger to that location. In summary, "hunt & peck" keyboarders do very little "hunting" but a great deal of "pecking." For this reason the mere "painting out" of a key's lettering has little impact on experienced "hunt & peck" students.

From its inception, keyboarding instruction has attempted to determine the instruction process that most effectively switches the "hunt & peck" student from "wrong fingers" to finger-key relationships that support touch keyboarding. Three possibilities exist. First, the instructor can verbally describe the correct finger applications. Second, the instructor can employ a vision shield that prevents the student from practicing "hunt & peck" habits. Third, the instructor can employ keyboarding instruction software that places sequenced keyboard characters on the computer screen at a rate sufficiently rapid to disallow the student time to visually guide a finger to a selected key. Teacher verbalization is the simplest and most direct instruction process. However, ingrained "hunt & peck" habits are highly resistant to change, and without the necessary degree of student discipline, or teacher insistence, these habits deflect verbalized instruction.

In consideration of immediate classroom availability, a computer keyboard vision shield is today's most practical and productive means for eliminating "hunt & peck" keying. Denied the opportunity to visually observe and guide his fingers, the student has only two choices. One is to

enter no data. The other is to employ short, tactile finger reaches, movements that can be supported by kinesthetic or muscular sensations. This simple process forces the "hunt & peck" student to become an "all finger" touch keyboarder.

The writer produces and markets a computer keyboard vision shield titled THE TOUCH – KEY GUIDE. Constructed of flexible plastic, the shield weighs less than 3 ozs. and is readily folded into an 18 in. x 5 in. x 0.5 in. form which is easily stored underneath the keyboard. In a practical sense the shield is indestructible; while easily bent the plastic immediately "pops back" into its original form. The shield fits any keyboard whose horizontal length is between 15 and 20 inches, the horizontal range of all standard desktop keyboards. In addition to the desktop keyboard shield, a shield designed for the notebook computer will soon be available. For more information visit www.keyboardteacher.net

The TOUCH-KEY GUIDE resulted from the author's brief experience as a middle school keyboarding instructor. Following years of employment as a high school keyboarding teacher, upon his transition to a middle school the author's immediate impression of middle school students was their limited self-discipline. This lack of discipline, or positive motivation, related to the students inability to execute "undesired" teacher instructions that dealt with their "hunt & peck" keying habits. Thus, the author concluded that until students of middle school maturity are prevented from visually observing their fingers and the keyboard, their conversion from "hunt & peck" key entry is somewhere between extremely difficult and impossible. Following this middle school activity, his final teaching experience, the author constructed, patented, and initiated the national marketing of the TOUCH-KEY GUIDE. A primary motivation for this undertaking was the author's perception that should someone with his background in typewriting and keyboarding instruction encounter frustration with middle school programs—how difficult must it be for teachers who enter this situation with little or no previous teaching experience. To date, some 400,000 TOUCH-KEY GUIDES have been distributed to keyboarding instructors—the great majority of whom are teachers in middle school programs.

A SOFTWARE SOLUTION FOR "HUNT & PECK"

The writer predicts that keyboarding instruction will accelerate its movement from the high school to the middle school and, eventually, to the elementary school. However, unlike the traditional high school offering, prehigh school keyboarding in large numbers is being added to another course, generally the computer literacy/technology program. Indeed, keyboarding is a logical component of computer literacy—if ample time and knowledgeable instruction is provided. However, the computer literacy instructor is normally involved with an established program before being assigned to teach keyboarding and will find it extremely difficult—perhaps impossible—to provide the instruction necessary to convert "hunt & peck" keyboarders into touch performers. One middle school teacher stated that due to keyboarding instruction being only a small portion of her school's computer literacy grade, many "hunt & peck' students opt to take a failing keyboarding grade rather than encounter the "pain" required to become a touch keyboarder. Undoubtedly, many middle school computer literacy instructors, in light of limited instruction time and a lack of familiarity with keyboarding instruction, choose to only give lip service to keyboarding or to position it as the final course element, taught only if end-of-course

time remains available. Due to the demands of keyboarding instruction on middle school resources, numbers of middle school curriculums presently do not offer keyboarding, a number likely to increase.

The solution: enlist the full instruction capabilities of the computer. The writer has developed one such program, keyboarding instruction software that employs a simple game to force the student to abandon "hunt & peck." Titled Speed Builders and copyrighted in 1986, the game is based on limiting the time the student has to strike a key. This is accomplished by a full graphic display of the keyboard on the computer screen. Once the key to be struck is designated by a specific color, the keyboarder is given one second to strike that key in order to earn points, otherwise points are lost. After the required score is attained for a specific lesson, the student is permitted to move forward to the next lesson.

Prior to playing Speed Builders, each lesson requires the student to learn and practice the correct finger reaches for the keys introduced in that lesson. After completing these drill lines, titled Skill Drills, the student switches to Speed Builders. In Speed Builders each key introduced in the current lesson, plus all keys previously introduced, are randomly and serially presented on the displayed keyboard. At the conclusion of a 1-minute interval, a scorecard flows to the screen and displays the points earned, the student name, and the lesson number. The writer has determined that the visual guidance of one's finger to a key cannot be accomplished in less than one second and any key requiring more than one second to strike is assume to be a "hunt & peck" operation. Speed Builders' score is based on the number of correct keys struck within one second, minus the number of keys that required more than one second to strike. Assume that 58 keys were struck, 55 within one second, but three key strikes required more than one second. Thus 58-3 = 55 net keystrokes that are divided by 5, the characters in a standard keyboarding word, which gives 11 words. As the required striking interval is one second, the pacing rate is 12 words a minute. Finally, the net 11 words keyed are multiplied by the 12 words a minute pacing rate to provide a "game score" of 132 (58-3 / 5 x 12 = 132). With 140 established as the minimum score needed to reflect a touch entry performance, the student is required to repeat the timings, perhaps revisiting the drill lines, until the 140 score is attained.

While no instruction process can anticipate and overcome every conceivable difficulty, the beauty of employing Speed Builders in keyboarding instruction is the relief it brings the instructor. No longer must the instructor be continually involved in the mundane and time consuming—yet ineffective--task of observing students and repeatedly reminding "hunt & peck" activists to apply correct finger-key associations. In theory, Speed Builders can eliminate the total involvement of the instructor other than to periodically verify the student's Speed Builders scores.

In addition to its ability to enforce student touch keying, Speed Builders is unparalleled in forcing students of all ability levels to increase their keying speed. In playing Speed Builders the student sets the desired pacing rate, selecting from a range of 1 through 35 words per minute. As noted, the higher the pacing rate the more points the student earns—if the established pace can be maintained. A 24 words per minute pace permits only ½ second to strike the designated key to earn points--a pace that few keyboarders can maintain. Indeed, a keyboarder who can score 500 points is an extremely skilled performer. The intense focus demanded of the student while

playing Speed Builders, in the opinion of the author, requires that its timing interval not exceed one minute. From his involvement with Speed Builders, the author is convinced that its presentation of only one key at a time is more effective in developing "real world" keying speed than the use of traditional timings that employ contextual copy.

Implementation of the described Speed Builders software involves a major departure from traditional typewriting and keyboarding instruction. Of necessity, "gamesmanship," widely avoided by traditional teachers, forms a major element of the instruction procedure. The author initially included the Speed Builders game within a comprehensive software program titled The Keyboard Teacher for the sole purpose of entertaining students. However, after years of observing students enthusiastically engage in Speed Builders play, and following his retirement from teaching, it finally "dawned" upon the author that Speed Builders was a unique instruction method for controlling student "hunt & peck" keying.

THE IMPORTANT BUT IGNORED NUMERIC 10-KEYPAD

Other than keyboarding instruction being a remedial course, the most significance difference between typewriting and its successor, keyboarding, is that the computer keyboard includes a 10-keypad for numeric data entry.

Although the alphabetic keyboard, in theory, is replaceable by a voice recognition microphone, the 10-keypad is quite safe from being replaced by voice recognition technology. Why? It is far quicker to key, say, "3," "8," and "1," than to vocalize these digits, or to say the number "three eighty one." The importance of numeric data accuracy is equally supportive of physical finger entry—relative to human speech. For alphabetic text, spell checkers are available to assist the keyboarder in locating entry errors. However, a "number checker" is nonexistent for numeric data, there being no such thing as a "wrong" or incorrect number. And, unlike words, one cannot find a dictionary that correctly "spells" numbers.

With the increasing importance of numeric data in computer usage, the value of a 10-key touch entry skill is obvious. Despite the beginning keyboarding student having developed an habituated "hunt & peck" skill on the alphabetic (or typewriter) keyboard, he likely has had little experience using the 10-keypad. Recognizing that a 10-key touch skill can be developed in only two or three hours of instruction, this should be accomplished prior to moving the student to the alphabetic keyboard. Following the student's acquisition of a touch 10-key skill, he will become aware of its benefit and gain motivation to remedy his "hunt & peck" efforts on the alphabetic keyboard. It is incongruous for a student to apply a productive touch skill to the 10-keypad, then revert to "hunt & peck" entry upon switching to the alphabetic keys.

While "hunt & peck" entry on the 10-keypad is less spectacular than that involving the alphabetic keyboard—it is highly unproductive. "Hunt & peck" on the 10-keypad normally includes only one or two fingers, some 20% to 40% of the five fingers applied in its touch operation. Based on 5 digit numbers, a touch operator of the 10-keypad can key at a 50+ numbers per minute rate. Observing society's widespread "hunt & peck" operation of the 10-

keypad, it is submitted that few events possess the potential to increase the efficiency of our economy as does providing our citizens with a 10-key touch entry skill.

For certain, the use of the numeric keypad will grow at an accelerating rate. A user "in waiting" is the touch-tone phone. Due to a phenomenal growth in the need of unique numbers for home phones, business phones, fax machines, etc., the phone industry is finding it necessary to increase phone numbers from 10 to 13 digits to provide ample unique, or workable, numbers. With the growth in telephone usage and the lengthening of phone numbers, surely the phone industry will become aware of the advantages of providing phones that have a 1 to 9 digit sequence, rather than the present 9 to 1 sequence. Obviously, once the phone keys are made a replica of the computer10-keypad, a phone operator can apply his rapid keypad touch skill in keying telephone numbers.

CLOSING COMMENTS

Many of the writer's positions regarding keyboarding instruction differ markedly from those long accepted by typewriting instruction—and passed on to today's keyboarding instructors. Hopefully, readers will objectively compare these divergent views, determining which has the greater support of educational research, and reasoned thought, prior to arriving at their own conclusions. Having heavily engaged in typewriting and keyboarding instruction over a teaching career that spans thirty plus years, the writer feels an obligation to share his teaching experiences with the present—and future--community of keyboarding instructors.

Readers are invited to engage in a discussion of the keyboarding instruction topics presented in this writing. The writer's email address is: grhodes5@charter.net

George S. Rhodes
3131 Woods Lane
Marietta, GA 30060
GRhodes111@aol.com

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